

February 2000

22603-JUS-0000-06000

**CHARACTERIZATION REPORT/
RESPONSE ACTION WORK PLAN
FORMER JUSTUS COMPRESSOR STATION
STARK COUNTY, OHIO**



Prepared for

**COLUMBIA GAS TRANSMISSION CORPORATION
Environmental Affairs-Remediation
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Prepared by

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**Baker Environmental, Inc.
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2.0 ENVIRONMENTAL SETTING

2.1 Physical Setting

The Former Justus CS is surrounded by an 8-foot high chain link fence and occupies less than one tenth of an acre in area. A gravel base, overgrown with vegetation, covers the ground surface within the fenced area of the CS. The land surrounding the CS is primarily woodlands with agricultural fields to the north. Topography at the CS is relatively flat for the geographic area with a slight downward sloping to the southeast (i.e., northwest being topographically up gradient and the southeast being topographically down gradient). The CS is at an elevation of approximately 1,040 feet above mean sea level (msl) with the surrounding ridges generally less than 1,200 feet msl (Figure 1-1).

2.2 Climate

The geographic area of the portion of Ohio in which the CS is located receives mean annual precipitation of approximately 33 inches. The precipitation is fairly well distributed throughout the year with fall having the least precipitation of the four seasons and late winter/early spring having the most precipitation. Prevailing wind direction is from the south. Temperatures vary widely, with average lows during the winter months reaching 20 degrees Fahrenheit to highs during the summer months reaching 83 degrees Fahrenheit. (Soil Survey of Stark County, Ohio, 1971).

2.3 Surface Water Hydrology

The Justus CS is located less than 1,500 feet north of an unnamed, intermittent tributary to Bean Creek, which flows west about 2,000 feet to Sugar Creek (Figure 1-1).

During characterization field activities, it was observed that surface drainage from the CS flows southeast toward a small drainage ditch paralleling the access road (Township Road

303). However, there does not appear to be a defined drainage channel/pathway from the CS toward the access road. In addition, there does not appear to be a defined flow connection between the drainage ditch paralleling the access road and the unnamed tributary to Bean Creek.

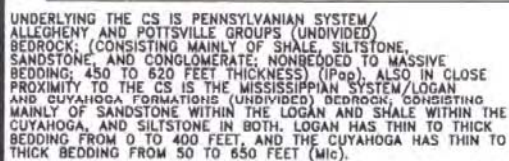
2.4 Geology and Soils

The Justus CS is located near the limit of the glaciated part of the Allegheny Plateau Physiographic Province (Figure 2-1). The bedrock in this region is sedimentary in origin and consists predominantly of the Pennsylvanian System/Allegheny and Pottsville Groups. Bedrock in the area consists mainly of shale, siltstone, sandstone, and conglomerate with nonbedded to massive bedding and thicknesses up to 600 feet (ODNR, April 1997).

The Wooster silt loam is the predominant soil in the area. These soils typically are moderately well drained with moderate permeability. (Soil Survey of Stark County, Ohio, 1971). Based on visual observations made during the site characterization, soils consisted predominantly of brown sandy clays with trace gravel. A more permeable clayey sand was observed from approximately 3 to 3.5 feet below ground surface (bgs). This perched water horizon was encountered at this depth in almost all borings advanced for the characterization. Bedrock was not encountered during the characterization activities with the deepest boring advanced to 6 feet bgs.

2.5 Hydrogeology and Groundwater Quality

In valley bottoms, useable quantities of groundwater are generally obtained from both shallow wells installed in unconsolidated deposits and wells installed in deeper bedrock formations. In other topographic areas, wells installed in bedrock aquifers or springs are a source of potable water supplies.



OHIO

QUADRANGLE LOCATION

FIGURE 2-1
SITE GEOLOGY
FORMER JUSTUS COMPRESSOR STATION

COLUMBIA GAS TRANSMISSION CORPORATION
JUSTUS, OHIO

characterization activities, soil lithologies were documented in the field log book and also recorded onto boring logs. These boring logs are provided within Appendix F of this report.

4.3 Analytical Results of Investigative Samples

A summary of methods analyzed for individual PRAs is provided in Table 4-2. For each media (soil, groundwater, etc.) Table 4-3 (Summary of Analytical Results) lists only those constituents for which a valid positive detection was reported by the laboratory for at least one sample at the CS.

Figure 4-1 presents analytical results that exceed the CALs and/or background on the CS base map to facilitate review. The results are discussed by matrix and PRA to facilitate review in the following subsections.

The Comprehensive Analytical Results tables, as prepared by ESI, and sample chain-of-custody forms are included in Appendix B. Columbia maintains a hard copy of all analytical data should additional review be needed.

4.3.1 Background Sampling Results

One background soil sample was collected from 1 to 3 feet bgs at three locations believed to not be affected by operations of the compressor station (Figure 4-1) during the initial characterization field activities in May 1997. These three samples were located outside the fence line; northeast, north, and west of the compressor at locations topographically upgradient. All three of these samples were analyzed for Table 1 (CWP) constituents.

The three background samples (JUS-ASB008-70001, JUS-ASB009-70001, and JUS-ASB010-70001), exhibited no detections of SVOCs, or PCBs. However, a low level detection of methylene chloride (.024 mg/kg) was reported in background sample JUS-

Table 4-3
Summary of Analytical Results

PRA		1	2
PRA Description		PRA #1-PIPELINE DRIP CISTERN	
Sample Type		Normal Sample	
Sample Id		JUS-ASB001-70001	JUS-ASB002-70001
Depth - ft bgs		5.5 - 6	5.5 - 6
Result Units		MG/KG	MG/KG
Category	Analyte	Result Flag	Result Flag
VOA	METHYLENE CHLORIDE	85	ND
BNA	DIESEL	ND	ND
METAL	BARIUM, TOTAL	5500	98.5
	CHROMIUM, TOTAL	230	10.8 J
	LEAD, TOTAL	400	ND
	NICKEL, TOTAL	1600	15.0
	ARSENIC, TOTAL	.43	8.5
		> CAL *	> CAL *
		Result Flag	Result Flag
		> CAL *	> CAL *
		Normal Sample	Normal Sample
		JUS-ASB003-70001	JUS-ASB003-70001
		0 - 1	0 - 1
		MG/KG	MG/KG
		Result Flag	Result Flag
		> CAL *	> CAL *
		12	12
		130	130
		19.2 J	19.2 J
		ND	ND
		21.9	21.9
		X	X
		16.9	16.9
		X	X

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.

J flag - Numerical value is an estimated quantity.

ND indicates Non-Detect

Blank cells in result column indicate an analysis was not performed for that analyte.

Table 4-3
Summary of Analytical Results

PRA										
PRA Description										
Sample Type										
Sample Id		JUS-ASB003-70002		JUS-ASB004-70001		JUS-ASB004-70002				
Depth - ft bgs		1.5 - 2.5		0 - 1		1.5 - 2.5				
Result Units		MG/KG		MG/KG		MG/KG				
Action Level		Result Flag		> CAL*		Result Flag		> CAL*		> CAL*
VOA	METHYLENE CHLORIDE	85								
	DIESEL	ND		9.1		100				
METAL	BARIUM, TOTAL	5500								
	CHROMIUM, TOTAL	230								
	LEAD, TOTAL	400								
	NICKEL, TOTAL	1600								
	ARSENIC, TOTAL	.43								

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.

J flag - Numerical value is an estimated quantity.

ND indicates Non-Detect

Blank cells in result column indicate an analysis was not performed for that analyte.

Table 4-3
Summary of Analytical Results

PRA									
PRA Description									
Sample Type									
Category	Analyte	Sample Id	JUS-ASB005-70001	JUS-ASB005-70002	JUS-ASB006-70001				
VOA	METHYLENE CHLORIDE	Depth - ft bgs	0 - 1	1.5 - 2.5	0 - 1				
BNA	DIESEL	Result Units	MG/KG	MG/KG	MG/KG				
METAL		Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*	
		85							
			10		66		7.1		
	BARIUM, TOTAL	5500							
	CHROMIUM, TOTAL	230							
	LEAD, TOTAL	400							
	NICKEL, TOTAL	1600							
	ARSENIC, TOTAL	.43							

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.

J flag - Numerical value is an estimated quantity.

ND indicates Non-Detect

Blank cells in result column indicate an analysis was not performed for that analyte.

**Table 4-3
Summary of Analytical Results**

PRA		3	4
PRA Description		PRA #3-VERTICAL SEPARATOR	PRA #4-BACKGROUND SAMPLE
Sample Type		Normal Sample	Normal Sample
Sample Id		JUS-ASB006-70002	JUS-ASB007-70001
Depth - ft bgs		1.5 - 2.5	2.5 - 3
Result Units		MG/KG	MG/KG
Category	Analyte	Action Level	Result Flag
VOA	METHYLENE CHLORIDE	85	Result Flag
BNA	DIESEL	18	ND
METAL	BARIUM, TOTAL	5500	57.5
	CHROMIUM, TOTAL	230	11.1
	LEAD, TOTAL	400	ND
	NICKEL, TOTAL	1600	20.5
	ARSENIC, TOTAL	.43	8.5
			X

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.

J flag - Numerical value is an estimated quantity.

ND indicates Non-Detect

Blank cells in result column indicate an analysis was not performed for that analyte.

Table 4-3
Summary of Analytical Results

PRA		5				
PRA Description		S				
Sample Type		Field Duplicate (Rep)				
Sample Id		JUS-ASB009-70001	JUS-ASB010-70001	JUS-ASB012-71001		
Depth - ft bgs		1 - 3	1 - 3	0 - .5		
Result Units		MG/KG	MG/KG	MG/KG		
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85	0.024		ND	
BNA	DIESEL		ND		5.6	
METAL	BARIUM, TOTAL	5500	81.0		730	
	CHROMIUM, TOTAL	230	12.2		9.4	
	LEAD, TOTAL	400	178		ND	
	NICKEL, TOTAL	1600	161		13.2	
	ARSENIC, TOTAL	.43	135	X	155	X

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.

J flag - Numerical value is an estimated quantity.

ND indicates Non-Detect

Blank cells in result column indicate an analysis was not performed for that analyte.

Table 4-3
Summary of Analytical Results

PRA									
PRA Description ;									
Sample Type		Normal Sample							
Sample Id		JUS-ASB011-70001		JUS-ASB012-70001		JUS-ASB013-70001			
Depth - ft bgs		0 - .5		0 - .5		0 - .5			
Result Units		MG/KG		MG/KG		MG/KG			
Action Level	Analyte	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*		
85	METHYLENE CHLORIDE								
	DIESEL								
5500	BARIUM, TOTAL								
230	CHROMIUM, TOTAL								
400	LEAD, TOTAL								
1600	NICKEL, TOTAL								
.43	ARSENIC, TOTAL								

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.

J flag - Numerical value is an estimated quantity.

ND indicates Non-Detect

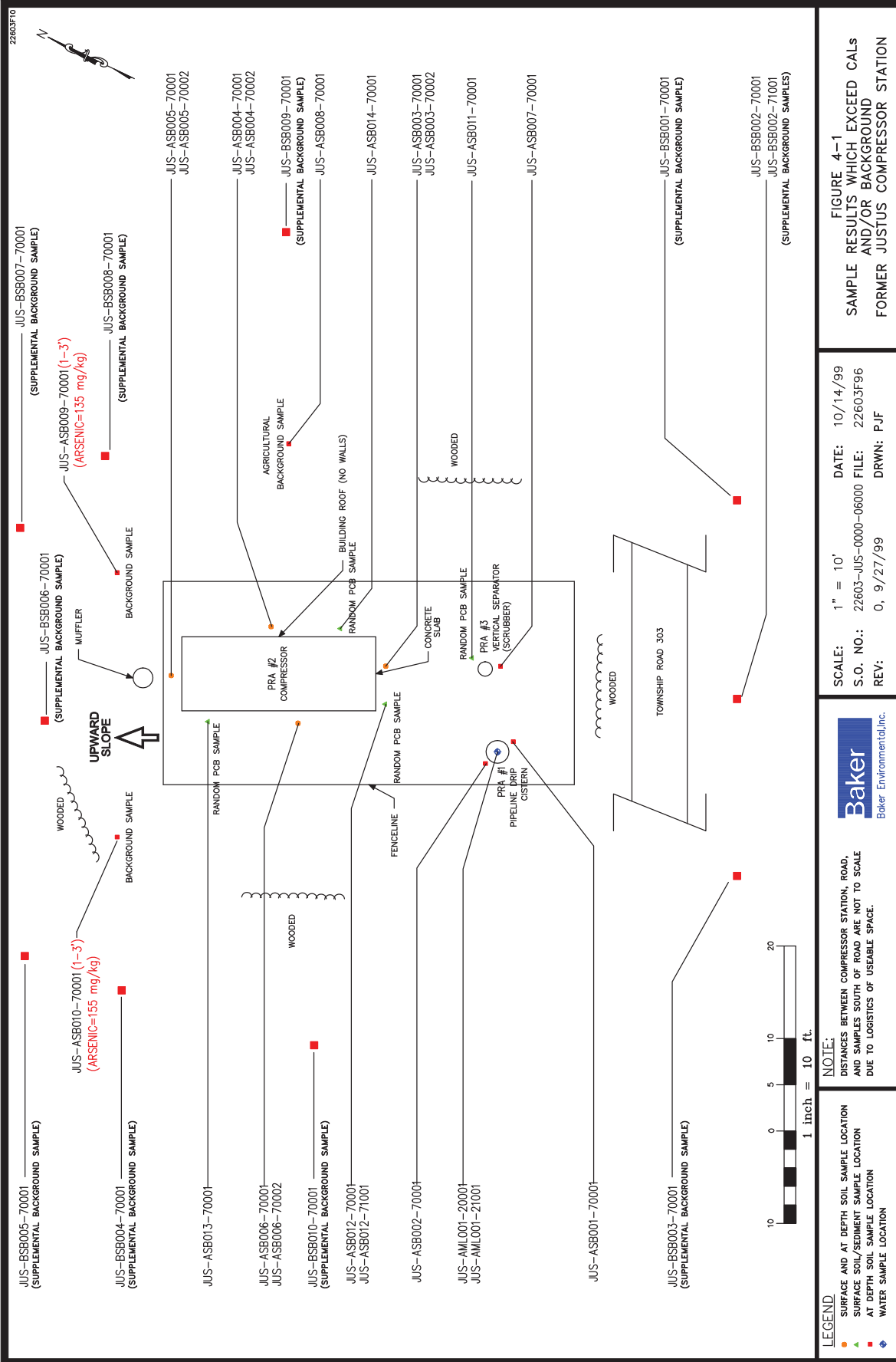
Blank cells in result column indicate an analysis was not performed for that analyte.

Table 4-3
Summary of Analytical Results

	PRA				
	PRA Description				
	Sample Type				
	Sample Id				
	JUS-ASB014-70001				
	Depth - ft bgs				
	0 - .5				
	Result Units				
	MG/KG				
Category	Analyte	Action Level	Result Flag	> CAL*	
VOA	METHYLENE CHLORIDE	85			
BNA	DIESEL				
METAL	BARIUM, TOTAL	5500			
	CHROMIUM, TOTAL	230			
	LEAD, TOTAL	400			
	NICKEL, TOTAL	1600			
	ARSENIC, TOTAL	.43			

Notes:

* "> CAL" equals "X" when reported value is above characterization action level for this locale.
J flag - Numerical value is an estimated quantity.
ND indicates Non-Detect
Blank cells in result column indicate an analysis was not performed for that analyte.



ASB009-70001. The low level detection of methylene chloride in sample JUS-ASB009-7001 is below the corresponding CAL of 85 mg/kg.

Laboratory analytical results also indicated the presence of various metals at low concentrations below CALs in all three background samples, with the exception of arsenic. Arsenic was detected above CALs in all three background samples with concentrations of 8.5 mg/kg, 135 mg/kg, and 155 mg/kg, respectively. Only the values from JUS-ASB009-70001 and JUS-ASB010-70001 are presented as highlighted on Figure 4-1.

In addition, TPH for Diesel Range Organics (TPH-DRO) was detected in samples JUS-ASB008-70001 and JUS-ASB010-70001 at concentrations of 30 mg/kg and 5.6 mg/kg, respectively. However, during collection of the background samples there was no evidence of soil staining, free product, or elevated PID readings.

It should be noted that the arsenic concentration detected in background samples JUS-ASB009-70001 and JUS-ASB010-70001 (refer to Figure 4-1) were collected from an area that was topographically upgradient and not located adjacent to any compressor station equipment. Samples JUS-ASB009-70001 and JUS-ASB010-70001 were not included in the background comparison because the values are uncharacteristically elevated in comparison to the remaining background sample and at other facilities in Ohio. The soil observed at these background locations differed from that observed in the shallow soil samples collected on-site. This may possibly reflect reworking of the soils on-site when the compressor station constructed or natural variability. However, the arsenic concentration of 8.5 mg/kg at JUS-ASB008-70001 is typical for sites in Ohio and was included in the background calculation for arsenic.

4.3.1.1 Supplemental Background Sampling Results

Comments from the USEPA (June 17 and July 6, 1999) on the draft CR (May 1999) exhibited a concern regarding the arsenic concentrations in the three previously-collected background samples. There was a concern that two of the background samples may not be representative of indigenous arsenic concentrations in the geographic area. Therefore, to address these concerns, ten additional background samples (including three quality control samples) were collected for arsenic analysis.

The supplemental background sampling was performed on August 24, 1999. Consistent with previous background sampling, the ten supplemental background samples were collected from 1 to 3 feet bgs in areas surrounding the site not believed to have been impacted from previous compressor station operations (see Figure 4-1). Arsenic was detected in all ten supplemental background samples with concentrations ranging from 7.2 mg/kg in sample JUS-BSB008-70001 to 18.2 mg/kg in sample JUS-BSB004-70001.

As provided in the CWP (June 1996), the highest concentration of a constituent detected in the background samples, or the value calculated in Appendix G, is used to establish the background concentration for this constituent at the CS. The calculated background value for arsenic (CBVA) was 17.0 mg/kg, as presented in Appendix G in the draft CR. This value was used to evaluate the results of the remaining PRAs. However, with a new CBVA of 23.34 mg/kg (see Appendix G for calculation worksheet), there appears to be no change to the anticipated remedial activities warranted at the site. Therefore, the two previously-collected background samples (JUS-ASB009-70001 and JUS-ASB010-70001) that exhibited elevated arsenic concentrations (135 mg/kg and 155 mg/kg, respectively) appear not to be representative of arsenic levels observed in indigenous soils in the geographic area. Response actions to these two samples are provided in Section 6.0 of this report.

4.3.2 Random PCBs Sampling Results

One random PCB soil sample was collected from 0 to 6 inches bgs at four locations within the limits of compressor station operations. These four samples (JUS-ASB011-70001, JUS-ASB012-70001, JUS-ASB013-70001, and JUS-ASB014-70001) were collected at random locations to confirm that PCB containing oils had not been released. All four of these soil samples had no detection of PCB constituents.

4.3.3 Water Sampling Results

PRA #1 Pipeline Drip Cistern

One water sample (JUS-AML001-20001) and a quality control duplicate sample (JUS-AML001-21001) were collected from the concrete Pipeline Drip Cistern (PRA #1). Laboratory analytical results of the water samples indicated no evidence of SVOC, PCB, TPH for Gasoline Range Organics (TPH-GRO), or metal constituents. However, methylene chloride was detected in both samples at concentrations of 19 ug/L and 28 ug/L, respectively. Methylene chloride is commonly utilized by analytical laboratories as a solvent for such uses as equipment preparation (i.e., cleaning of glassware). It is not uncommon to have residual methylene chloride detected in environmental samples analyzed by analytical laboratories. In addition, TPH-DRO also was detected in both samples at estimated concentrations of 400 ug/L and 440 ug/L, respectively. However, during sample acquisition there were no elevated PID readings and a sheen was not present on the water within the cistern.

4.3.4 Soil Potential Release Areas

PRA #1 Pipeline Drip Cistern

One hand auger boring was advanced on two sides of the cistern to a depth of six feet bgs (two borings total). One subsurface soil sample was collected from each boring at a depth

of 5.5 to 6 feet bgs. Soil samples were collected east of the cistern (JUS-ASB001-70001) and west of the cistern (JUS-ASB002-70001)

Laboratory analytical results indicated no evidence of VOCs, SVOCs, PCBs, and TPH. However, some metals were detected in both soil samples below CALs with the exception of arsenic. Arsenic was detected in both soil samples at concentrations of 8.5 mg/kg and 16.9 mg/kg, respectively. However these concentrations are below the CBVA of 17.0 mg/kg.

PRA #2 Compressor

One hand auger boring was advanced adjacent to each of the four sides of the Compressor to a depth of 2.5 feet bgs (four borings total). A surface soil sample (0 to 1 feet bgs) and a subsurface soil sample (1.5 to 2.5 feet bgs) was collected at each location, boring numbers JUS-ASB003, 004, 005, and 006.

Laboratory analytical results of all eight soil samples indicated no evidence of BTEX or PCB constituents. However, TPH-DRO constituents were detected in seven of the eight samples. Only sample JUS-ASB003-70002 had no detection of TPH-DRO constituents. The seven remaining soil samples reported TPH-DRO concentrations of 12 mg/kg, 9.1 mg/kg, 100 mg/kg, 10 mg/kg, 66 mg/kg, 7.1 mg/kg, and 18 mg/kg, respectively. There was no evidence of soil staining, free product, or elevated PID readings observed during sample collection.

PRA #3 Vertical Separator

One hand auger boring was advanced to a depth of 5 feet bgs adjacent to the Vertical Separator with one subsurface soil sample (JUS-ASB007-70001) being collected from the 4 to 5 feet bgs interval. Laboratory analytical results of the subsurface soil sample indicated no evidence of BTEX, PCB, or TPH constituents.

Test Boring Logs

Baker**Baker Environmental**

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor StationSO NO.: 22603-JUSBORING NO.: PRA1-Boring A

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

TOP OF PVC CASING: _____

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	MC Liners	Casing	Augers	Core Barrel				
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 6.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Concrete Cistern (Table 1-CWP)

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	N							
2								
3								
4					shallow perched groundwater at ~ 3.5'			
5					Cistern ~ 5.5' deep	5.0		
6	S-1		JUS-ASB-001-70001	0.0	CLAYEY SAND; brown; soft; moist (wet above)	6.0		
					Bottom of Boring at 6.0'			
7								
8								
9								
10								

DRILLING CO.: Subsurface, Inc.DRILLER: (b) (4)BAKER REP.: (b) (4)BORING NO.: PRA1-Boring A

SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station
 SO NO.: 22603-JUS BORING NO.: PRA1-Boring B
 COORDINATES: EAST: NORTH:
 ELEVATION: SURFACE: TOP OF PVC CASING:

Rig: Geoprobe	MC Liners	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 6.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Concrete Cistern (Table 1-CWP)

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	N				shallow perched groundwater at ~ 3.5'			
2								
3								
4								
5	5.0	S-1	JUS-ASB-002-70001	0.0	Cistern ~ 5.5' deep	5.0		
6	6.0				CLAYEY SAND; brown; soft; moist (wet above)	6.0		
7					Bottom of Boring at 6.0'			
8								
9								
10								

DRILLING CO.: Subsurface, Inc.
 DRILLER: (b) (4)

BAKER REP.: (b) (4)
 BORING NO.: PRA1-Boring B SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station
 SO NO.: 22603-JUS BORING NO.: PRA2-Boring A
 COORDINATES: EAST: NORTH:
 ELEVATION: SURFACE: TOP OF PVC CASING:

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	MC Liners	Casing	Augers	Core Barrel				
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 5.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Compressor (BTEX, TPH, PCBs)

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	S-1	JUS-ASB-003-70001	0.0	GRAVELLY SAND, trace clay			
	1.5	N						
2	2.5	S-2	JUS-ASB-003-70002	0.0	Water from 3.0' to 3.5' (Clayey Sand; brown)			
3		N						
4	4.0	N			SANDY SILTY CLAY; brown; plastic			
5	5.0							
6					Bottom of Boring at 5.0'			
7								
8								
9								
10								

DRILLING CO.: Subsurface, Inc.
 DRILLER: (b) (4)

BAKER REP.: (b) (4)
 BORING NO.: PRA2-Boring A SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station

SO NO.: 22603-JUS

BORING NO.:

PRA2-Boring B

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

TOP OF PVC CASING: _____

Rig: Geoprobe	MC Liners	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 4.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Compressor (BTEX, TPH, PCBs)

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	S-1	JUS-ASB-004-70001	0.0	GRAVELLY SAND, trace clay			
	1.5	N						
2	2.5	S-2	JUS-ASB-004-70002	0.0				
3					Water at 3.0'			
4	4.0	N						
					Bottom of Boring at 4.0'			
5								
6								
7								
8								
9								
10								

DRILLING CO.: Subsurface, Inc.

DRILLER: (b) (4)

BAKER REP.: (b) (4)

BORING NO.:

PRA2-Boring B

SHEET 1 OF 1

Baker**Baker Environmental**

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station

SO NO.: 22603-JUS

BORING NO.:

PRA2-Boring C

COORDINATES: EAST:

NORTH:

ELEVATION: SURFACE:

TOP OF PVC CASING:

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	MC Liners	Casing	Augers	Core Barrel				
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 4.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Compressor (BTEX, TPH, PCBs)

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)		Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	S-1	JUS-ASB-005-70001	0.0		GRAVELLY SAND, trace clay			
	1.5	N							
2	2.5	S-2	JUS-ASB-005-70002	0.0					
3						Water at 3.1'			
4	4.0	N							
						Bottom of Boring at 4.0'			
5									
6									
7									
8									
9									
10									

DRILLING CO.: Subsurface, Inc.

DRILLER: (b) (4)

BAKER REP.: (b) (4)

BORING NO.: PRA2-Boring C

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station

SO NO.: 22603-JUS

BORING NO.:

PRA2-Boring D

COORDINATES: EAST:

NORTH:

ELEVATION: SURFACE:

TOP OF PVC CASING:

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	MC Liners	Casing	Augers	Core Barrel				
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 4.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Compressor (BTEX, TPH, PCBs)

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)		Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	S-1	JUS-ASB-006-70001	0.0		GRAVELLY SAND, trace clay			
	1.5	N							
2	2.5	S-2	JUS-ASB-006-70002	0.0					
3						Water at 3.1'			
4	4.0	N							
						Bottom of Boring at 4.0'			
5									
6									
7									
8									
9									
10									

DRILLING CO.: Subsurface, Inc.

DRILLER:

(b) (4)

BAKER REP.:

(b) (4)

BORING NO.:

PRA2-Boring D

SHEET 1 OF 1

Baker**Baker Environmental**

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station

SO NO.: 22603-JUS

BORING NO.:

PRA3-Boring A

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

TOP OF PVC CASING: _____

Rig: Geoprobe	MC Liners	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 3.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Vertical Scrubber (BTEx, TPH, PCBs)

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	N							
2								
2.5								
3	S-1		JUS-ASB- 007-70001	0.0	Water at 3.0' Bottom of Boring at 3.0'	3.0		
4								
5								
6								
7								
8								
9								
10								

DRILLING CO.: Subsurface, Inc.

DRILLER: (b) (4)

BAKER REP.: (b) (4)

BORING NO.: PRA3-Boring A

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station

SO NO.: 22603-JUS

BORING NO.:

PRA4-Boring A

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

TOP OF PVC CASING: _____

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	MC Liners	Casing	Augers	Core Barrel				
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 3.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	---	--	--				
Fall	---	--	--	--				

Remarks: Background (Table 1-CWP)

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)		Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	N							
2		S-1	JUS-ASB-008-70001	0.0		SILTY CLAY; brown; damp to moist			
3	3.0								
4						Bottom of Boring at 3.0'			
5									
6									
7									
8									
9									
10									

DRILLING CO.: Subsurface, Inc.

DRILLER: (b) (4)

BAKER REP.: (b) (4)

BORING NO.:

PRA4-Boring A

SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station
 SO NO.: 22603-JUS BORING NO.: PRA4-Boring B
 COORDINATES: EAST: NORTH:
 ELEVATION: SURFACE: TOP OF PVC CASING:

Rig:	Geoprobe	MC Liners	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.	---	---	---	---	5/21/97	0.0 - 3.0		---
Length	4.0 feet	---	---	---	---				
Type	---	---	---	---	---				
Hammer Wt.	---	---	---	---	---				
Fall	---	---	---	---	---				

Remarks: Background (Table 1-CWP)

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	Lab ID	PID (ppm)		Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	N							
2		S-1	JUS-ASB-009-70001	0.0		SILTY CLAY; brown; damp to moist			
3	3.0								
4						Bottom of Boring at 3.0'			
5									
6									
7									
8									
9									
10									

DRILLING CO.: Subsurface, Inc.
 DRILLER: (b) (4)

BAKER REP.: (b) (4)
 BORING NO.: PRA4-Boring B SHEET 1 OF 1

Baker**Baker Environmental**

TEST BORING RECORD

PROJECT: Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station

SO NO.: 22603-JUS

BORING NO.: PRA4-Boring C

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

TOP OF PVC CASING: _____

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	MC Liners	Casing	Augers	Core Barrel				
Size (ID)	1-5/8" I.D.	---	--	--	5/21/97	0.0 - 3.0		--
Length	4.0 feet	---	--	--				
Type	---	---	--	--				
Hammer Wt.	---	--	--	--				
Fall	---	--	--	--				

Remarks: Background (Table 1-CWP)

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	1.0	N						
2		S-1	JUS-ASB-010-70001	0.0	SILTY CLAY; brown; damp to moist			
3	3.0							
4					Bottom of Boring at 3.0'			
5								
6								
7								
8								
9								
10								

DRILLING CO.: Subsurface, Inc.

DRILLER: (b) (4)

BAKER REP.: (b) (4)

BORING NO.: PRA4-Boring C

SHEET 1 OF 1

*Worksheet for Site Specific Calculated Background Value
for Arsenic (CBVA) Determination*

APPENDIX G

WORKSHEET FOR SITE-SPECIFIC CALCULATED BACKGROUND VALUE FOR ARSENIC (CBVA)

FORMER JUSTUS COMPRESSOR STATION

I. BACKGROUND CALCULATION

Arsenic Results in Background Samples

a	=	10.9 mg/kg
b	=	12.0 mg/kg
c	=	10.8 mg/kg
d	=	18.2 mg/kg
e	=	10.4 mg/kg
f	=	8.7 mg/kg
g	=	10.8 mg/kg
h	=	7.2 mg/kg
i	=	10.6 mg/kg
j	=	17.1 mg/kg
n	=	number of sample results

Background Value For Arsenic Calculation

$$[A + B + C + \dots + J/n] \times 2 = \text{Calculated Background Value for Arsenic (CBVA)}$$

$$[(10.9 + 12.0 + 10.8 + 18.2 + \dots + 17.1)/10] \times 2 = \text{CBVA}$$

$$(116.7/10) \times 2 = \text{CBVA}$$

$$11.67 \times 2 = \text{CBVA}$$

$$23.34 \text{ mg/kg} = \text{CBVA}$$

II. COMPARISON TO HIGHEST BACKGROUND RESULTS

CBVA vs. Highest Background Result

23.34 mg/kg vs. 18.2 mg/kg

SITE SPECIFIC CALCULATED BACKGROUND VALUE FOR ARSENIC (CBVA) = 23.34 mg/kg

*Note: Calculations based on: "Data Collection and Evaluation, Human Health Risk Assessment Bulletin, No. 2, Supplemental Guidance to RAGs," Office of Technical Services, U.S. EPA Region IV, October 1996